

U.S. Application No.
Attorney Docket No. 2002B140/2

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. - 118. (Cancelled)

119. (Currently Amended) ~~The polymer product of the continuous process to produce a branched olefin polymer~~ A branched olefin polymer prepared from a continuous process comprising the steps of:

- 1) selecting a first catalyst component capable of producing a polymer having an Mw of 100,000 or less and a crystallinity of 5% or less under selected polymerization conditions;
- 2) selecting a second catalyst component capable of producing polymer having an Mw of 100,000 or less and a crystallinity of 20% or more at the selected polymerization conditions;
- 3) contacting the catalyst components in the presence of one or more activators with one or more C3 to C40 olefins; and,
- 4) at a temperature of greater than 100°C;
- 5) at a residence time of 120 minutes or less;
- 6) wherein the ratio of the first catalyst to the second catalyst is from 1:1 to 50:1;
- 7) wherein the activity of the catalyst components is at least 50 kilograms of polymer per gram of the catalyst compounds; and wherein at least 80% of the olefins are converted to ~~polymer.~~ polymer.

wherein the polymer has the following properties:

- a) a Dot T-Peel of 1 Newton or more on Kraft paper;
- b) an Mw of 10,000 to 100,000;
- c) a branching index (g') of 0.4 - 0.98 measured at the Mz of the polymer when the polymer has an Mw of 10,000 to 60,000, or

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a branching index (g') of 0.4 - 0.95 measured at the M_z of the polymer when the polymer has an M_w of 10,000 to 100,000; and
d) amorphous polymer segments and semi-crystalline polymer segments.

120. (Currently Amended) The polymer product of claim 119 where the polymer is a homopolypropylene or a copolymer of propylene and up to 5 mole% ethylene having:

- a) an isotactic run length of 1 to 30,
- b) a percent of r dyad of greater than 20%, and
- c) a heat of fusion of between 1 and 70 J/g. having the following properties:
 - ~~a) a Dot T Peel of 1 Newton or more on Kraft paper;~~
 - ~~b) an M_w of 10,000 to 100,000;~~
 - ~~c) a branching index (g') of 0.4 - 0.98 measured at the M_z of the polymer when the polymer has an M_w of 10,000 to 60,000; or~~
 - ~~a branching index (g') of 0.4 - 0.95 measured at the M_z of the polymer when the polymer has an M_w of 10,000 to 100,000; and~~
 - ~~d) amorphous polymer segments and semi-crystalline polymer segments.~~

121. (Previously Presented) The polymer product of claim 119 wherein the olefin comprises propylene.

122. (Previously Presented) The polymer product of claim 119 wherein the first catalyst component comprises a non-stereospecific metallocene catalyst compound.

123. (Previously Presented) The polymer product of claim 119 wherein the first catalyst component comprises a stereospecific metallocene catalyst compound.

124. (Previously Presented) The polymer product of claim 119 wherein the second catalyst component comprises a stereospecific metallocene catalyst compound.

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125. (Previously Presented) The polymer product of claim 119 wherein the second catalyst component comprises one or more of the racemic versions of:
dimethylsilyl (2-methyl-4-phenylindenyl) zirconium dichloride,
dimethylsilyl (2-methyl-4-phenylindenyl) zirconium dimethyl,
dimethylsilyl (2-methyl-4-phenylindenyl) hafnium dichloride,
dimethylsilyl (2-methyl-4-phenylindenyl) hafnium dimethyl,
dimethylsilyl bis(indenyl)hafnium dimethyl,
dimethylsilyl bis(indenyl)hafnium dichloride,
dimethylsilyl bis(indenyl)zirconium dimethyl,
dimethylsilyl bis(indenyl)zirconium dichloride,
the racemic isomers of:
dimethylsilanediylbis(2-methylindenyl)metal dichloride;
dimethylsilanediylbis(indenyl)metal dichloride;
dimethylsilanediylbis(indenyl)metal dimethyl;
dimethylsilanediylbis(tetrahydroindenyl)metal dichloride;
dimethylsilanediylbis(tetrahydroindenyl)metal dimethyl;
dimethylsilanediylbis(indenyl)metal diethyl; and
dibenzylsilanediylbis(indenyl)metal dimethyl;
wherein the metal can be chosen from Zr, Hf, or Ti.
126. (Previously Presented) The polymer product of claim 119 wherein the activator comprises an alumoxane.
127. (Previously Presented) The polymer product of claim 119 wherein the activator comprises an ionizing compound.
128. (Previously Presented) The polymer product of claim 119 wherein the activator comprises a non-coordinating anion.

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129. (Previously Presented) The polymer product of claim 119 wherein the first catalyst component is capable of polymerizing macromonomers having reactive termini; and the second component is capable of producing macromonomers having reactive termini.
130. (Previously Presented) The polymer product of claim 119 wherein the monomers comprise propylene and butene.
131. (Previously Presented) The polymer product of claim 119 further comprising diolefin.
132. (Currently Amended) The polymer product of ~~claim 134~~ claim 131 wherein the diolefin comprises one or more C4 to C40 diolefins.
133. (Currently Amended) The polymer product of ~~claim 134~~ claim 131 ~~wherein the~~ wherein the diolefin is selected from the group consisting of 1,6-heptadiene, 1,7-octadiene, 1,8-nonadiene, 1,9-decadiene, 1,10-undecadiene, 1,11-dodecadiene, 1,12-tridecadiene, 1,13-tetradecadiene, cyclopentadiene, vinylnorbornene, norbornadiene, ethylidene norbornene, divinylbenzene, dicyclopentadiene, polybutadienes having an Mw less than 1000 g/mol, or combinations thereof.
134. (Currently Amended) The polymer product of ~~claim 134~~ claim 119 further comprising one or more dienes selected from the group consisting of 1,6-heptadiene, 1,7-octadiene, 1,8-nonadiene, 1,9-decadiene, 1,10-undecadiene, 1,11-dodecadiene, 1,12-tridecadiene, 1,13-tetradecadiene, cyclopentadiene, vinylnorbornene, norbornadiene, ethylidene norbornene, divinylbenzene, dicyclopentadiene, polybutadienes having an Mw less than 1000 g/mol, or combinations thereof.
135. (Previously Presented) The polymer product of claim 119 wherein the reaction zone is a gas phase reactor.

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136. (Previously Presented) The polymer product of claim 119 wherein the reaction zone is a solution phase reactor.
137. (Previously Presented) The polymer product of claim 119 wherein the reaction zone is a slurry phase reactor.
138. (Currently Amended) The polymer product of ~~claim 36 wherein~~ claim 119 wherein the olefin comprises propylene and the reaction zone is a solution phase reactor.